ME 120 Experimental Methods

<u>Homework #7</u>: Displacement Sensing and Linear Least-Squares Data Fit with Lab View

1. (10 pts) A DC motor has an optical encoder mounted on its shaft. The model number written on the encoder is HEDS 5500 A04.

   a. How many counts per revolution does this encoder have? (Hint: this kind of information is given in the *data sheet* for the device. How might you go about looking for a data sheet?)

   b. With 4x interpolation from quadrature output, what angular resolution could you expect to achieve with this encoder?

2. (10 pts) EMfE Problem 8.33. Additionally, what kind of uncertainty results? Systematic or Random? Explain your answer.

3. (10 pts) Write a Lab View VI that will read a text file (spreadsheet text file), plot the data points, and plot the linear least-squares fitted line through the data. (See the Mathematics and Fitting Function Palettes.) Also show what the slope an intercept of the fitted line are using indicators. Which method of fitting should you use? What effects do different methods have on the fitted line? Use the least_squares_data data file available at:

   http://www.engr.sjsu.edu/bjfurman/courses/ME120/Data/